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Hiyama et al.

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(45) **Date of Patent: *Jul. 31, 2001**

(54) **MEDICAL IMAGE FILING SYSTEM ENABLING REGISTRATION AND RETRIEVAL OF A PLURALITY OF MEDICAL IMAGES**

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(*) Notice: This patent issued on a continued prosecution application filed under 37 CFR 1.53(d), and is subject to the twenty year patent term provisions of 35 U.S.C. 154(a)(2).

Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **08/900,882**

(22) Filed: **Jul. 25, 1997**

Related U.S. Application Data

(63) Continuation of application No. 08/417,832, filed on Apr. 6, 1995, now abandoned.

(30) **Foreign Application Priority Data**

Apr. 8, 1994 (JP) 6-071087

(51) **Int. Cl.**[7] **G06F 17/30**
(52) **U.S. Cl.** **707/104**; 358/296; 358/403
(58) **Field of Search** 395/601, 615, 395/653; 348/588, 74; 358/403, 296; 382/131, 132, 128; 702/39; 711/120; 345/340; 386/124; 364/521, 200; 707/104; 340/825.31; 435/5

(56) **References Cited**

U.S. PATENT DOCUMENTS

4,817,050 * 3/1989 Komatsu et al. 364/900
4,829,453 * 5/1989 Katsuta et al. 364/521
4,958,283 * 9/1990 Tawara et al. 382/131
4,962,449 * 10/1990 Schlesinger 364/200
5,001,569 * 3/1991 Shigyo 358/296
5,027,110 * 6/1991 Chang et al. 340/731
5,029,016 7/1991 Hiyama et al. 358/403
5,047,754 * 9/1991 Akatsuka et al. 345/163
5,111,306 5/1992 Kanno et al. 358/403
5,124,789 * 6/1992 Hiyama et al. 348/74
5,187,579 * 2/1993 Hiyama 348/588
5,209,220 * 5/1993 Hiyama et al. 600/109
5,241,472 * 8/1993 Gur et al. 382/128

(List continued on next page.)

FOREIGN PATENT DOCUMENTS

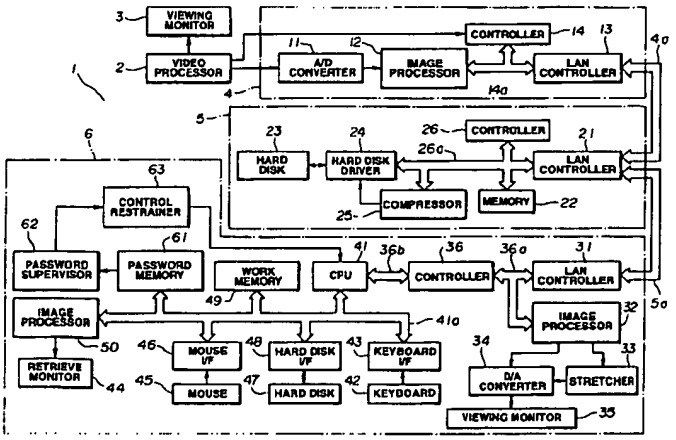
4212336A * 4/1992 (JP) .

Primary Examiner—Thomas Black
Assistant Examiner—Charles L. Rones
(74) *Attorney, Agent, or Firm*—Armstrong, Westerman, Hattori, McLeland & Naughton, LLP

(57) **ABSTRACT**

In an image filing system in accordance with the present invention, image files containing images that should be displayed on a viewing monitor in a conference unit are selected from among retrieved image files using a mouse. A CPU determines how many image files are selected using the mouse and identifies management information contained in the selected image files. Under the control of the CPU, images in a work memory are temporarily stored in an image processor. The images in the image processor are displayed on a retrieval monitor. Management information contained in the selected image files and the number of selected image files are supplied from the CPU to a controller over a bus. Reduced images provided in the form of digital data and contained in the selected image files in the image processor are supplied to a D/A converter under the control of the controller. The D/A converter de-quantizes the digital data into analog data so as to display the reduced images on the viewing monitor.

23 Claims, 14 Drawing Sheets



U.S. PATENT DOCUMENTS

5,245,329	*	9/1993	Gokcebay	340/825.31
5,276,851	*	1/1994	Thacker et al.	711/120
5,293,326	*	3/1994	Arima et al.	702/39
5,321,520	*	6/1994	Inga et al.	358/403
5,361,203		11/1994	Hiyama et al.	364/413.13
5,379,757	*	1/1995	Hiyama et al.	600/109
5,402,788	*	4/1995	Fujio et al.	600/423
5,416,602	*	5/1995	Inga et al.	358/403
5,440,401	*	8/1995	Parulski et al.	386/124
5,452,416	*	9/1995	Hilton et al.	395/161
5,493,315	*	2/1996	Atchley	345/516
5,528,492	*	6/1996	Fukushima	364/419.19
5,539,426	*	7/1996	Nishikawa et al.	345/115
5,568,271	*	10/1996	Fukuchi et al.	386/46
5,621,429	*	4/1997	Yamaashi et al.	345/340
5,682,529	*	10/1997	Hendry et al.	395/653
5,826,237	*	10/1998	Macrae et al.	705/2
5,836,872	*	11/1998	Kenet et al.	600/306
5,876,926	*	3/1999	Beecham	435/5

* cited by examiner

FIG.1

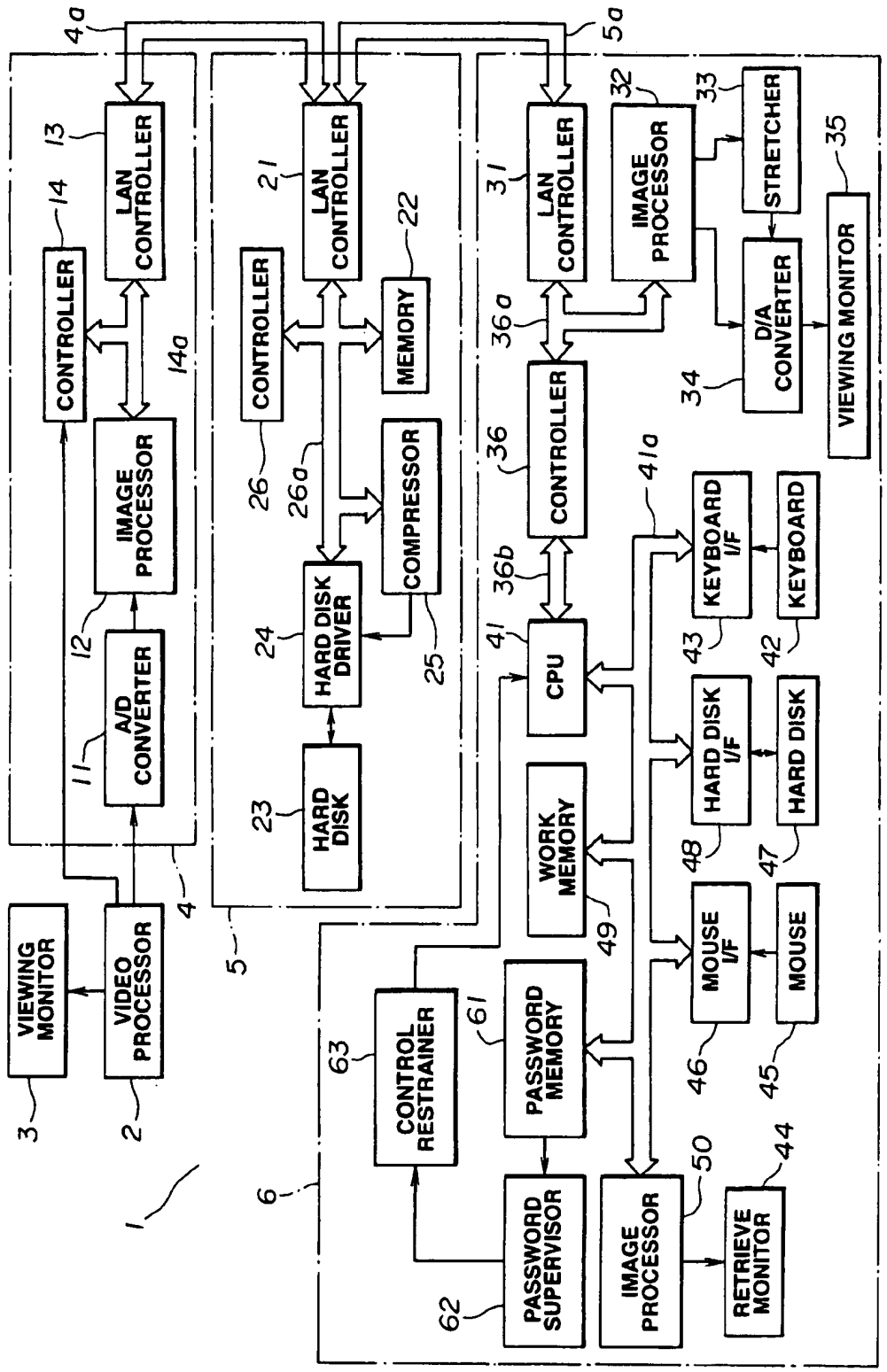

VIEWING MONITOR
VIDEO PROCESSOR
A/D CONVERTER
IMAGE PROCESSOR
CONTROLLER
LAN CONTROLLER
HARD DISK
HARD DISK DRIVER
COMPRESSOR
MEMORY
CONTROLLER
LAN CONTROLLER
CONTROLLER
LAN CONTROLLER
IMAGE PROCESSOR
STRETCHER
D/A CONVERTER
VIEWING MONITOR
CPU
WORK MEMORY
KEYBOARD I/F
KEYBOARD
HARD DISK I/F
HARD DISK
MOUSE I/F
MOUSE
CONTROL RESTRAINER
PASSWORD MEMORY
PASSWORD SUPERVISOR
IMAGE PROCESSOR
RETRIEVE MONITOR
1
2
3
4
4a
5
5a
6
11
12
13
14
14a
21
22
23
24
25
26
26a
31
32
33
34
35
36
36a
36b
41
41a
42
43
44
45
46
47
48
49
50
61
62
63

FIG.2

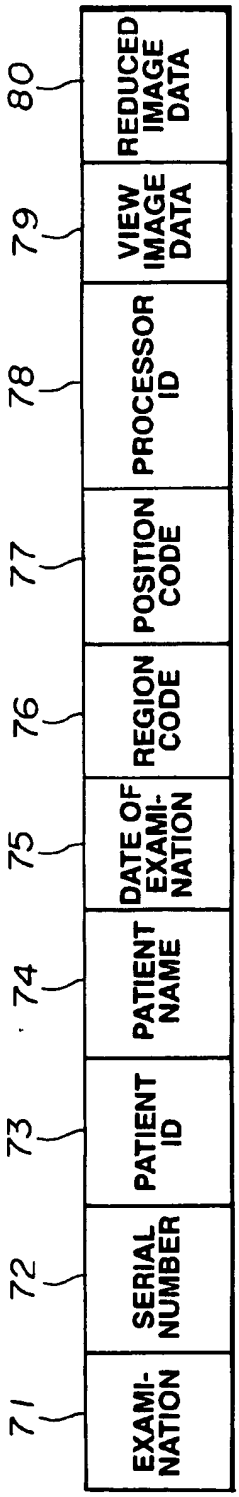

71
EXAMI-NATION
72
SERIAL NUMBER
73
PATIENT ID
74
PATIENT NAME
75
DATE OF EXAMI-NATION
76
REGION CODE
77
POSITION CODE
78
PROCESSOR ID
79
VIEW IMAGE DATA
80
REDUCED IMAGE DATA

FIG.3

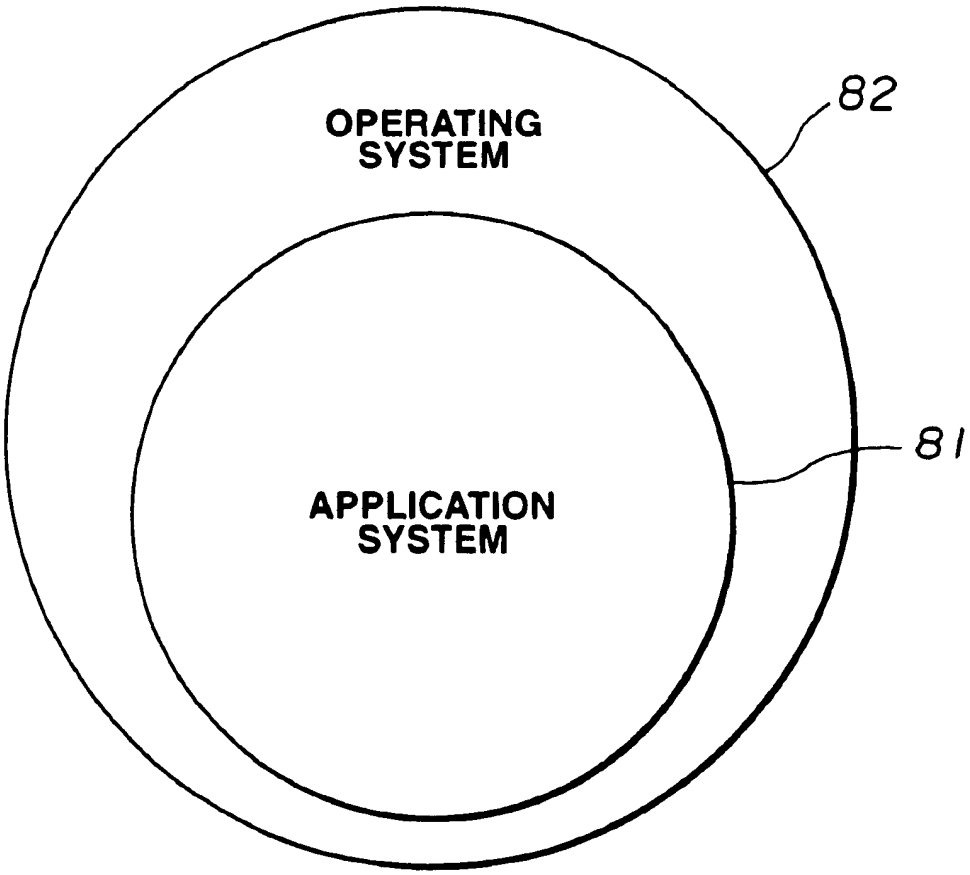


FIG.4

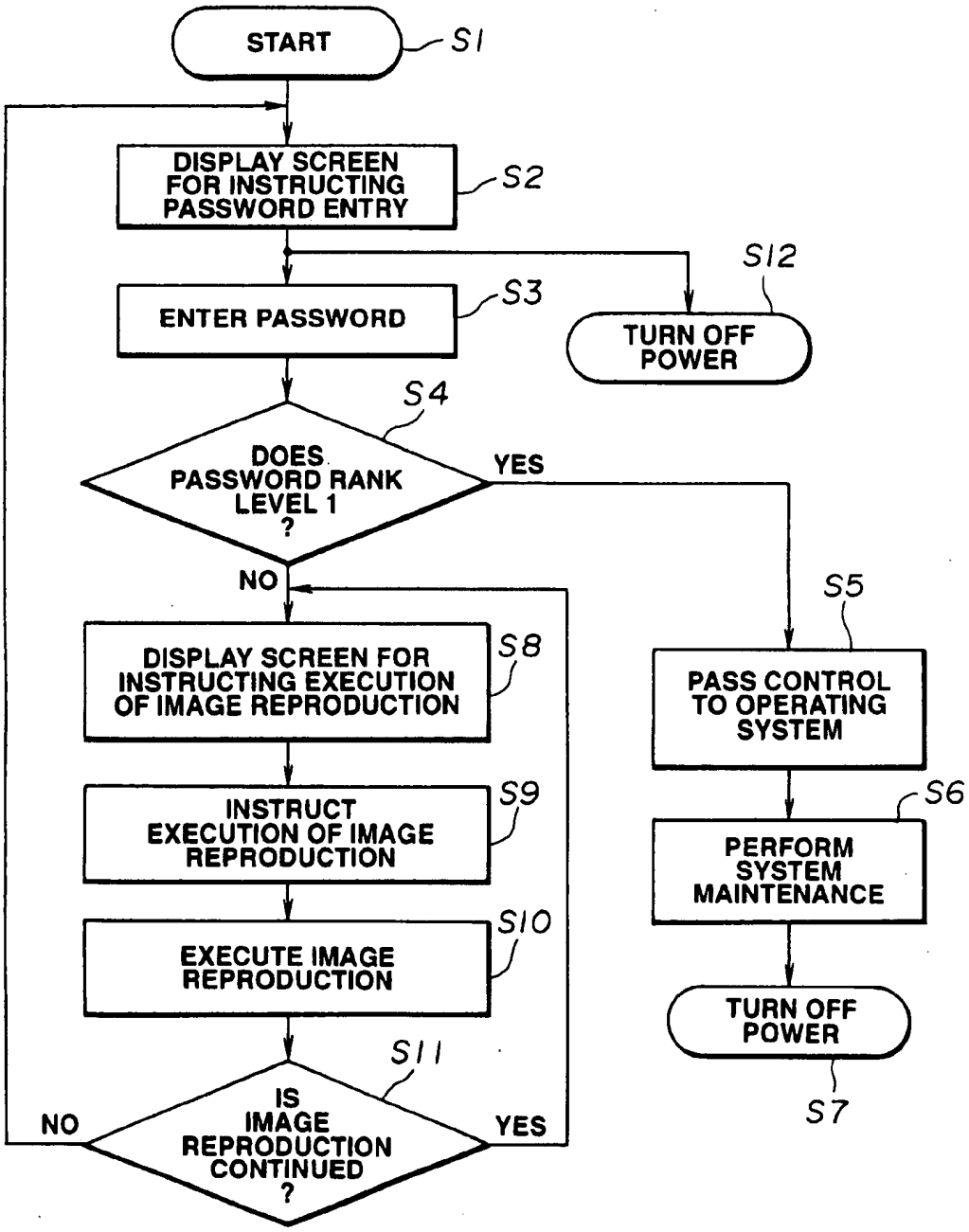

START
S1
DISPLAY SCREEN FOR INSTRUCTING PASSWORD ENTRY
S2
ENTER PASSWORD
S3
S12
TURN OFF POWER
S4
DOES PASSWORD RANK LEVEL 1 ?
YES
NO
S5
PASS CONTROL TO OPERATING SYSTEM
S6
PERFORM SYSTEM MAINTENANCE
TURN OFF POWER
S7
DISPLAY SCREEN FOR INSTRUCTING EXECUTION OF IMAGE REPRODUCTION
S8
INSTRUCT EXECUTION OF IMAGE REPRODUCTION
S9
EXECUTE IMAGE REPRODUCTION
S10
S11
IS IMAGE REPRODUCTION CONTINUED ?
NO
YES

FIG.5

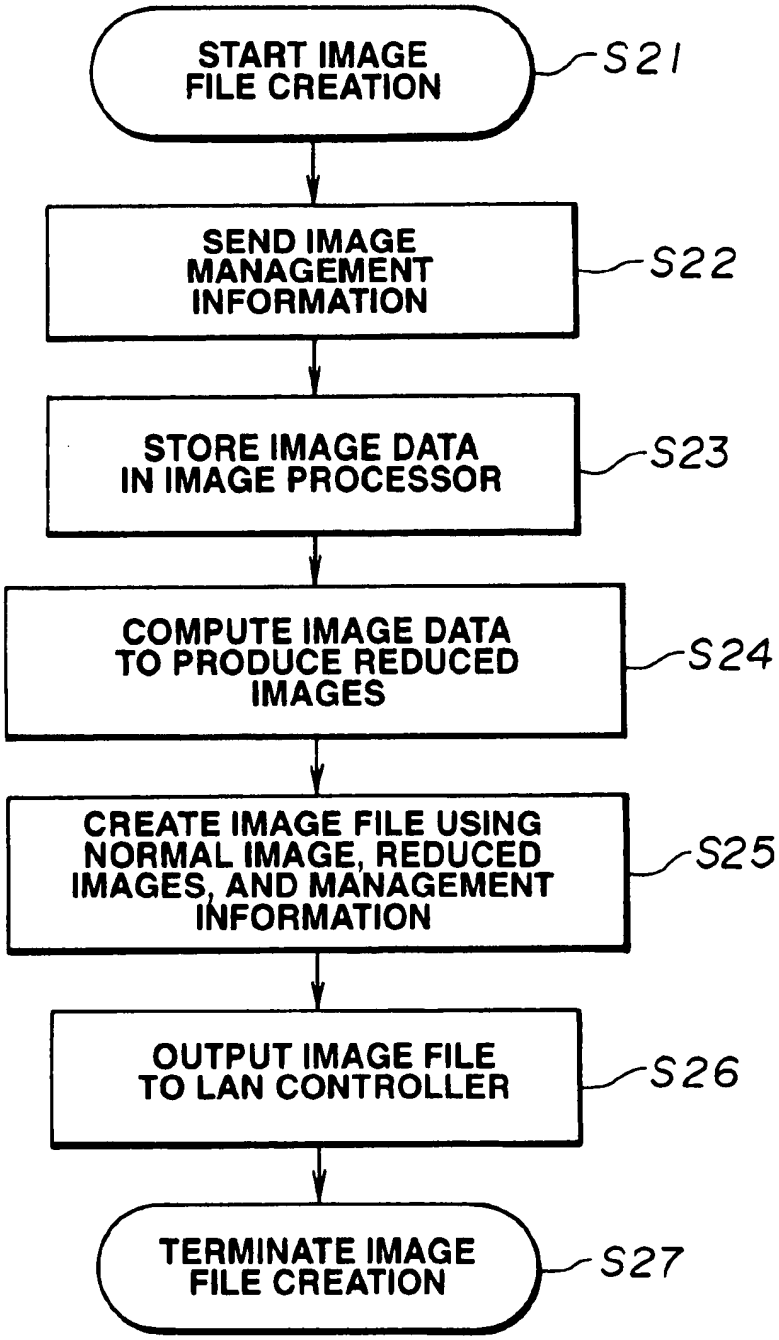

START IMAGE FILE CREATION
S21
SEND IMAGE MANAGEMENT INFORMATION
S22
STORE IMAGE DATA IN IMAGE PROCESSOR
S23
COMPUTE IMAGE DATA TO PRODUCE REDUCED IMAGES
S24
CREATE IMAGE FILE USING NORMAL IMAGE, REDUCED IMAGES, AND MANAGEMENT INFORMATION
S25
OUTPUT IMAGE FILE TO LAN CONTROLLER
S26
TERMINATE IMAGE FILE CREATION
S27

FIG.6

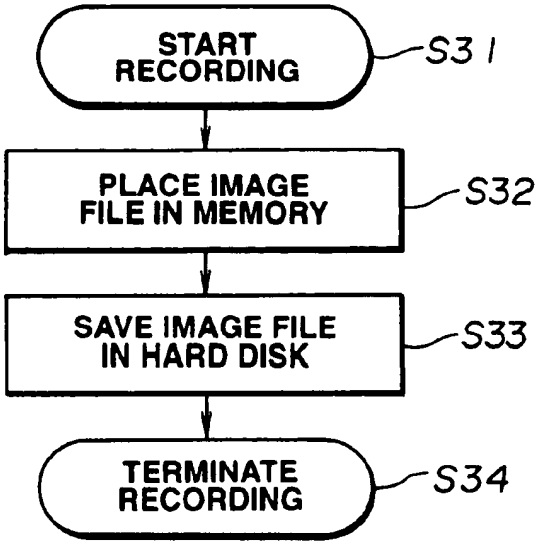


FIG.8

PATIENT ID	PATIENT NAME	DATE OF BIRTH	DATE OF EXAMINATION
1111	PATIENT A	62, 1, 1	94, 3, 15
1111	PATIENT A	62, 1, 1	94, 3, 16
1111	PATIENT A	63, 1, 1	94, 3, 17
1111	PATIENT A	64, 1, 1	94, 3, 18
⋮	⋮	⋮	⋮

45a

FIG.7

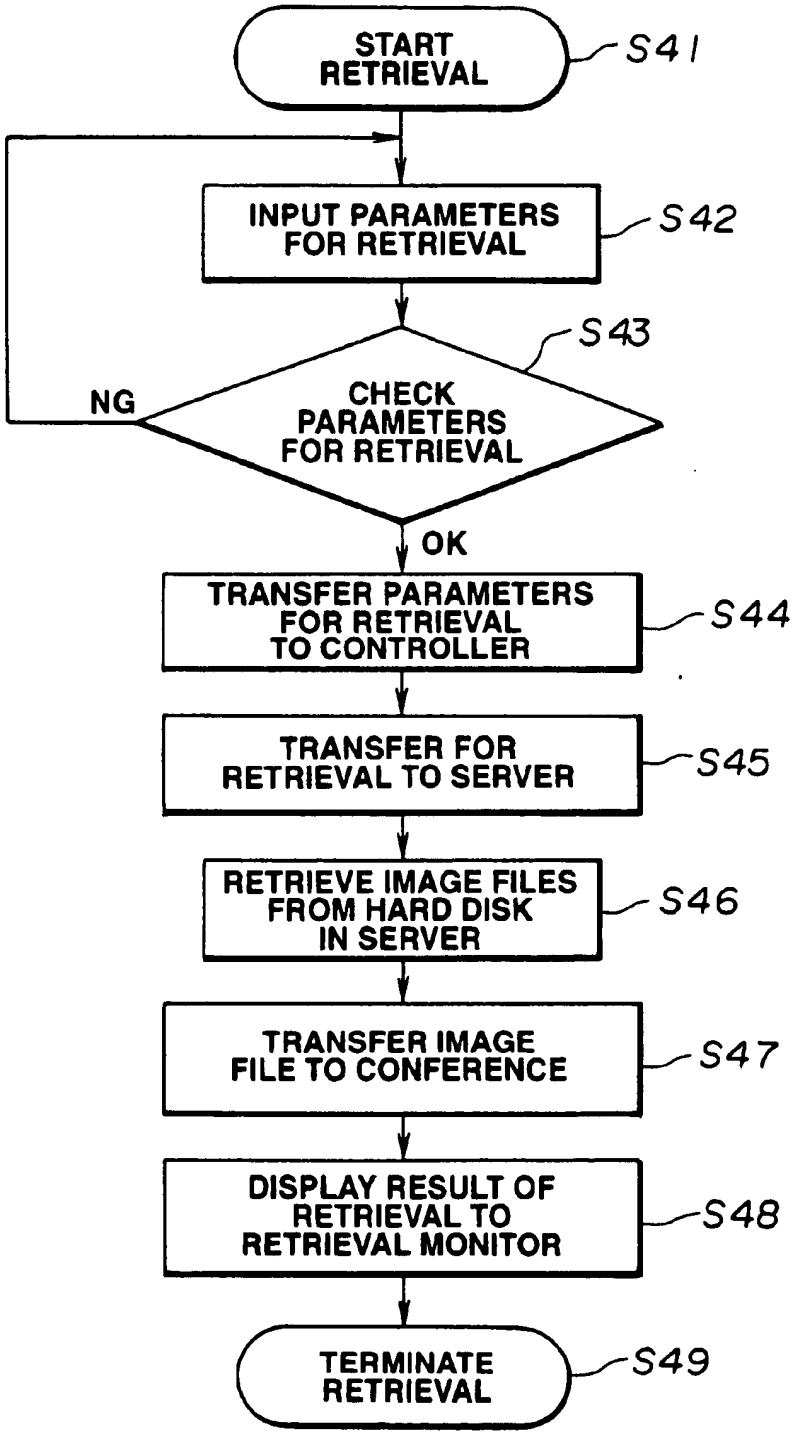

START RETRIEVAL
S41
INPUT PARAMETERS FOR RETRIEVAL
S42
S43
CHECK PARAMETERS FOR RETRIEVAL
NG
OK
TRANSFER PARAMETERS FOR RETRIEVAL TO CONTROLLER
S44
TRANSFER FOR RETRIEVAL TO SERVER
S45
RETRIEVE IMAGE FILES FROM HARD DISK IN SERVER
S46
TRANSFER IMAGE FILE TO CONFERENCE
S47
DISPLAY RESULT OF RETRIEVAL TO RETRIEVAL MONITOR
S48
TERMINATE RETRIEVAL
S49

FIG.9

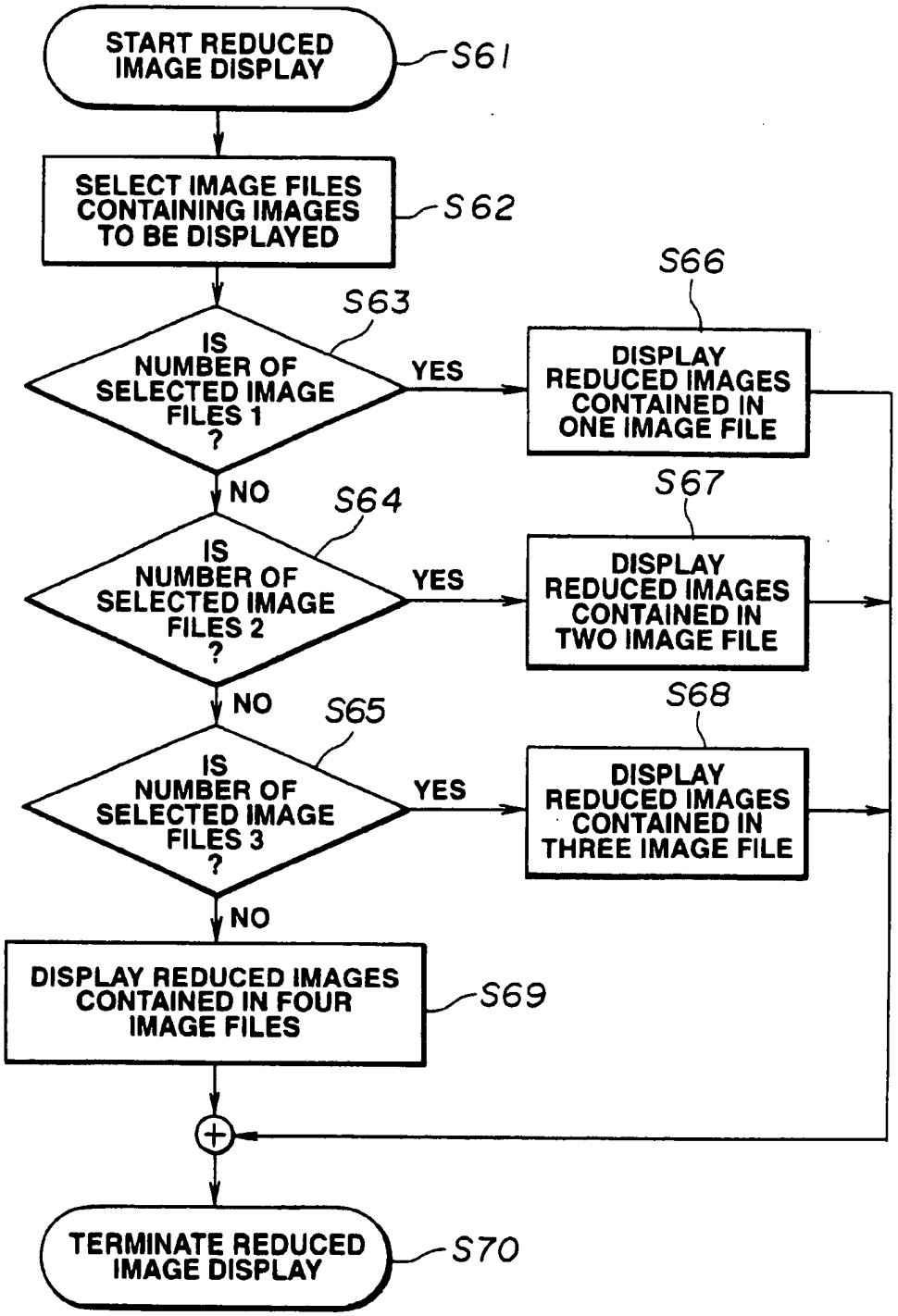

START REDUCED IMAGE DISPLAY
S61
SELECT IMAGE FILES CONTAINING IMAGES TO BE DISPLAYED
S62
S63
IS NUMBER OF SELECTED IMAGE FILES 1 ?
YES
S66
DISPLAY REDUCED IMAGES CONTAINED IN ONE IMAGE FILE
NO
S64
IS NUMBER OF SELECTED IMAGE FILES 2 ?
YES
S67
DISPLAY REDUCED IMAGES CONTAINED IN TWO IMAGE FILE
NO
S65
IS NUMBER OF SELECTED IMAGE FILES 3 ?
YES
S68
DISPLAY REDUCED IMAGES CONTAINED IN THREE IMAGE FILE
NO
DISPLAY REDUCED IMAGES CONTAINED IN FOUR IMAGE FILES
S69
TERMINATE REDUCED IMAGE DISPLAY
S70

FIG.10

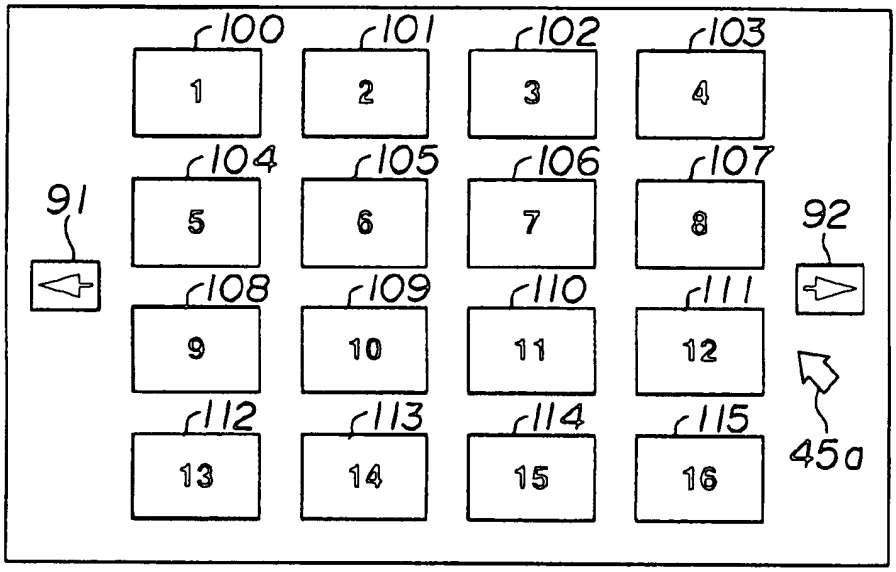

100
101
102
103
1
2
3
4
104
105
106
107
91
5
6
7
8
92
108
109
110
111
9
10
11
12
112
113
114
115
13
14
15
16
45a

FIG.11

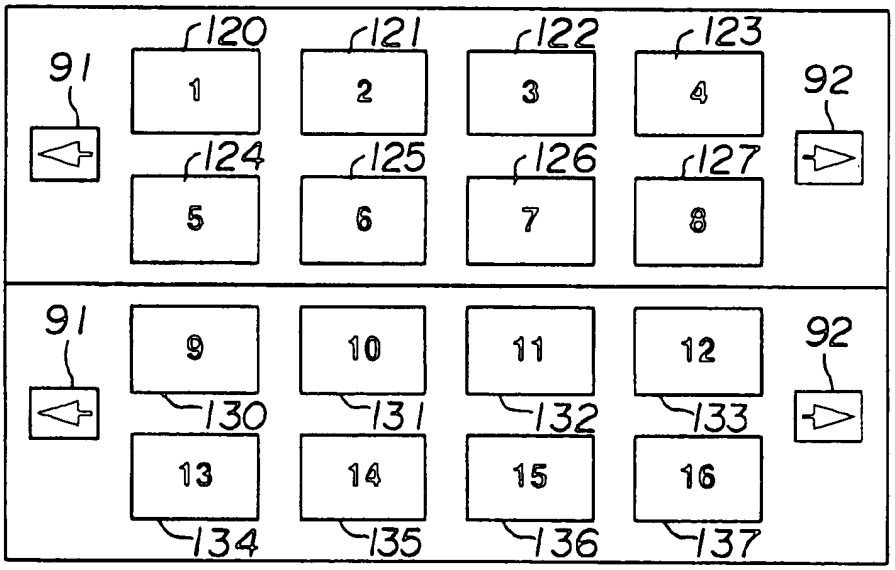

120
121
122
123
91
1
2
3
4
92
124
125
126
127
5
6
7
8
91
9
10
11
12
92
130
131
132
133
13
14
15
16
134
135
136
137

FIG.12

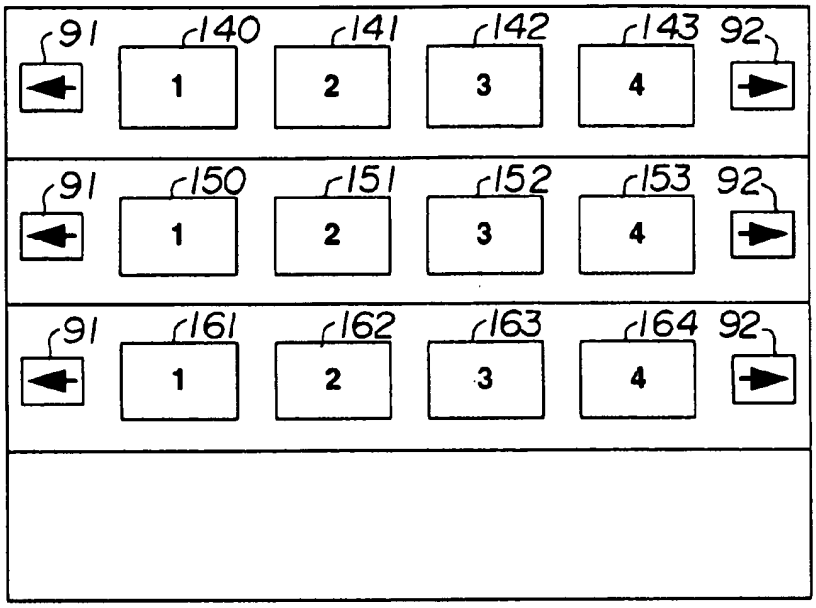

91
140
141
142
143
92
1
2
3
4
91
150
151
152
153
92
1
2
3
4
91
161
162
163
164
92
1
2
3
4

FIG.13

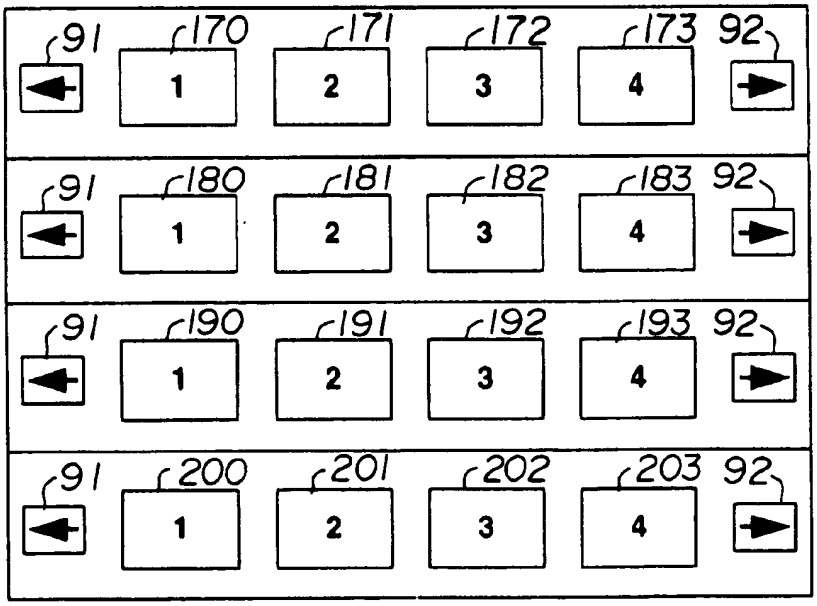

91
170
171
172
173
92
1
2
3
4
91
180
181
182
183
92
1
2
3
4
91
190
191
192
193
92
1
2
3
4
91
200
201
202
203
92
1
2
3
4

FIG.14

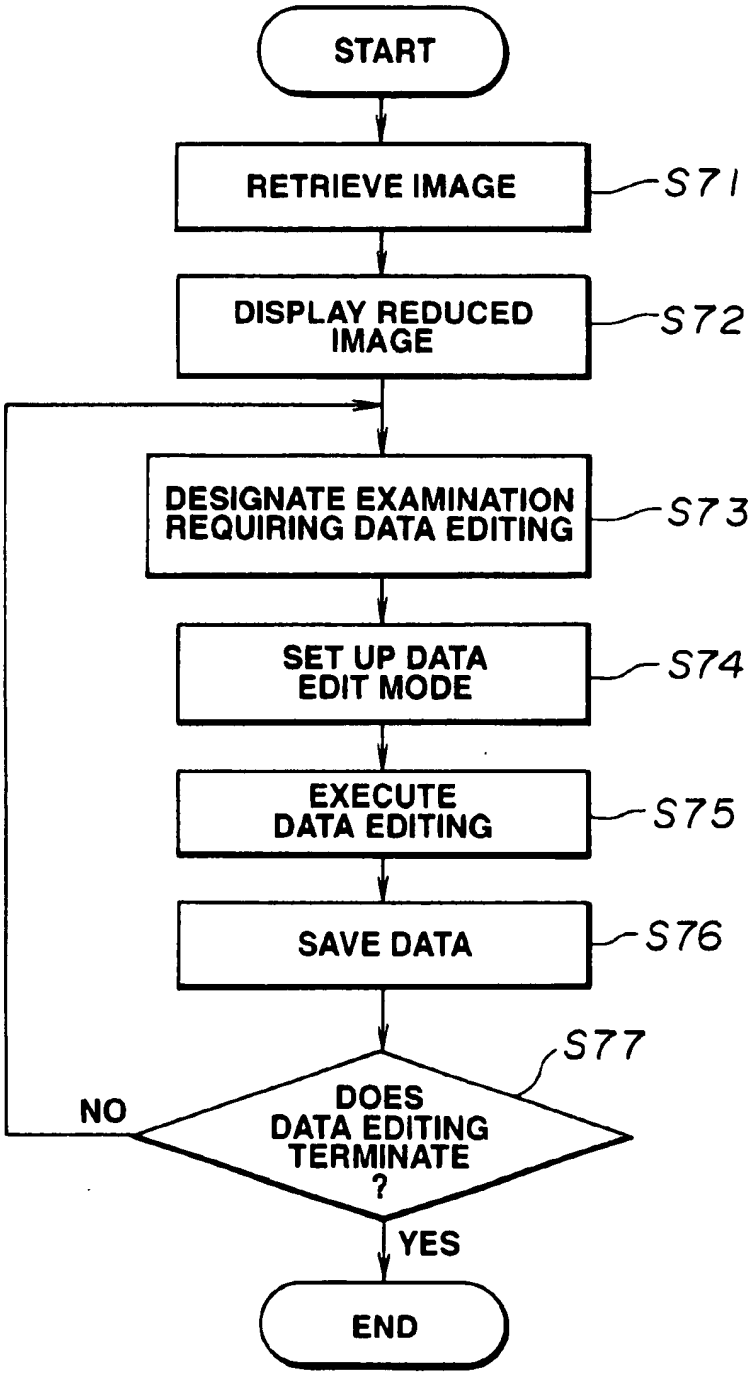

START
RETRIEVE IMAGE
S71
DISPLAY REDUCED IMAGE
S72
DESIGNATE EXAMINATION REQUIRING DATA EDITING
S73
SET UP DATA EDIT MODE
S74
EXECUTE DATA EDITING
S75
SAVE DATA
S76
S77
DOES DATA EDITING TERMINATE ?
NO
YES
END

FIG.15

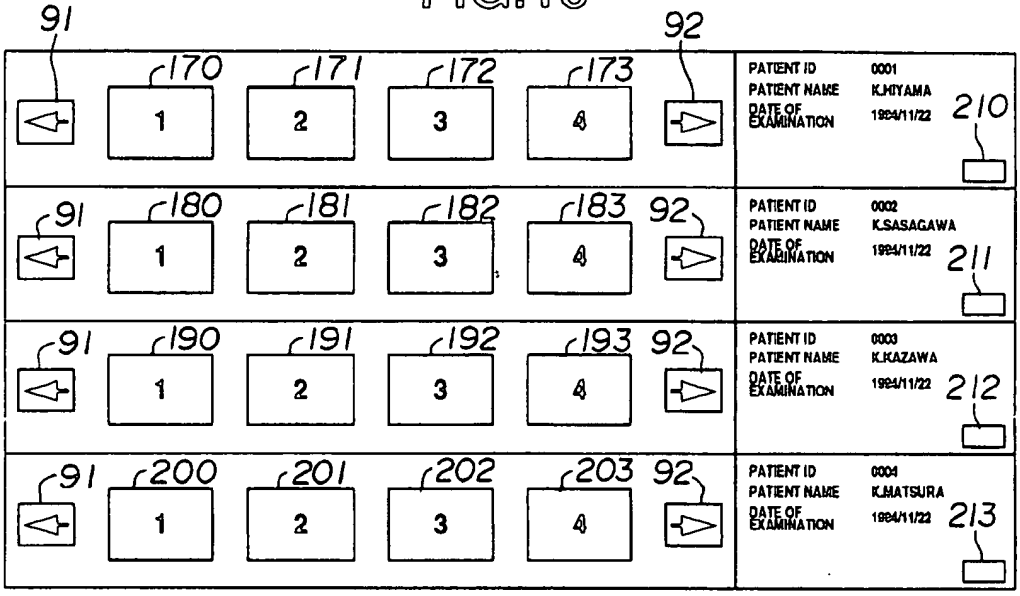

91
92
170
171
172
173
1
2
3
4
PATIENT ID 0001
PATIENT NAME K.HIYAMA
DATE OF EXAMINATION 1994/11/22
210
180
181
182
183
PATIENT ID 0002
PATIENT NAME K.SASAGAWA
DATE OF EXAMINATION 1994/11/22
211
190
191
192
193
PATIENT ID 0003
PATIENT NAME K.KAZAWA
DATE OF EXAMINATION 1994/11/22
212
200
201
202
203
PATIENT ID 0004
PATIENT NAME K.MATSURA
DATE OF EXAMINATION 1994/11/22
213

FIG.16

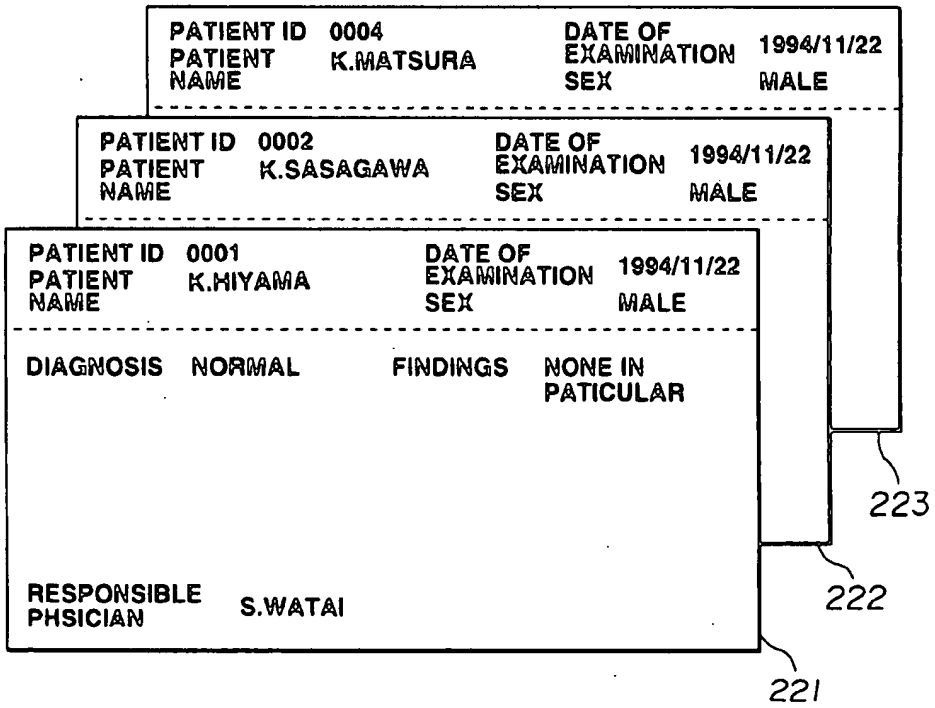

PATIENT ID 0004
PATIENT NAME K.MATSURA
DATE OF EXAMINATION 1994/11/22
SEX MALE
PATIENT ID 0002
PATIENT NAME K.SASAGAWA
DATE OF EXAMINATION 1994/11/22
SEX MALE
PATIENT ID 0001
PATIENT NAME K.HIYAMA
DATE OF EXAMINATION 1994/11/22
SEX MALE
DIAGNOSIS NORMAL
FINDINGS NONE IN PATICULAR
RESPONSIBLE PHSICIAN S.WATAI
223
222
221

FIG.17

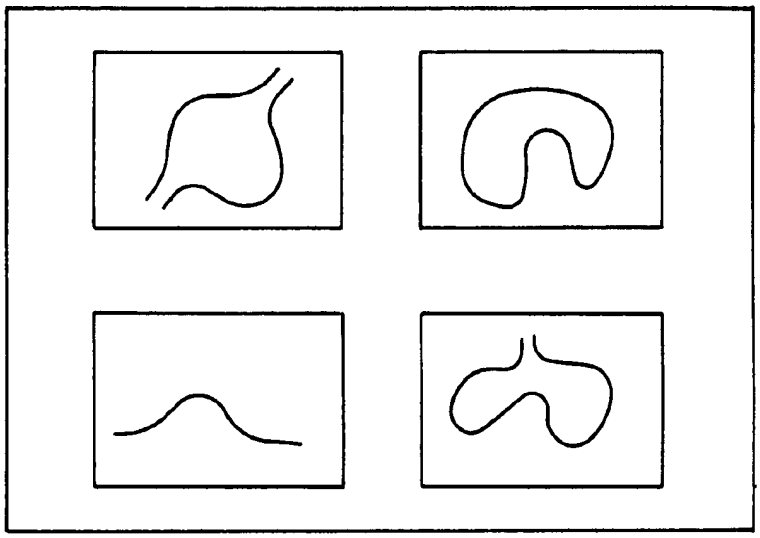


FIG.18

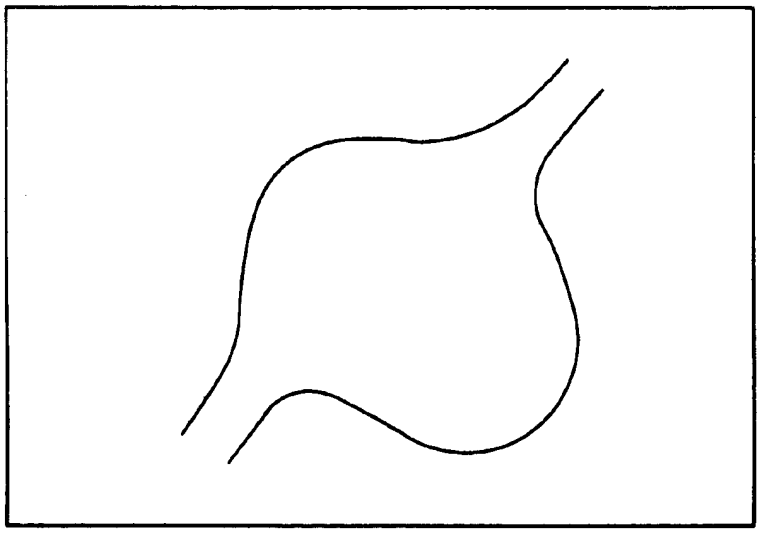
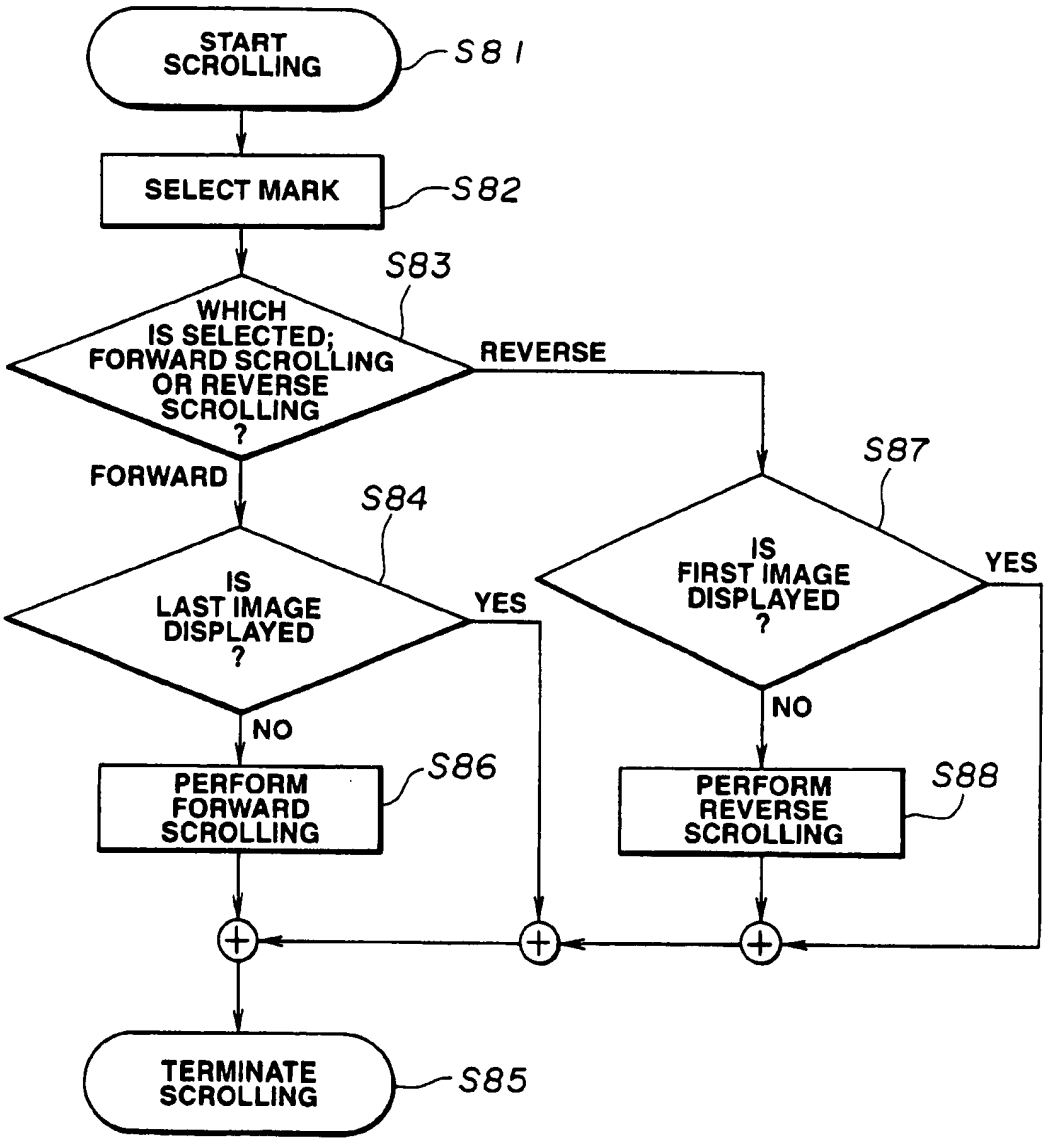


FIG.19


START SCROLLING
S81
SELECT MARK
S82
S83
WHICH IS SELECTED; FORWARD SCROLLING OR REVERSE SCROLLING ?
REVERSE
FORWARD
S84
IS LAST IMAGE DISPLAYED ?
YES
NO
S87
IS FIRST IMAGE DISPLAYED ?
YES
NO
PERFORM FORWARD SCROLLING
S86
PERFORM REVERSE SCROLLING
S88
TERMINATE SCROLLING
S85

MEDICAL IMAGE FILING SYSTEM ENABLING REGISTRATION AND RETRIEVAL OF A PLURALITY OF MEDICAL IMAGES

This application is a continuation of application Ser. No. 08/417,832 filed Apr. 6, 1995, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a medical image filing system in which a plurality of medical images are registered or retrieved on or from a medical image database for use in managing numerous images acquired by an endoscope system, diagnostic ultrasound system, or the like.

2. Description of the Related Art

Endoscope systems, in which an elongated insertional part of an endoscope is inserted into a body cavity and a solid-state imaging device or the like is used as an image pickup means, so that intracavitary organs can be examined or diagnosed while being viewed through a monitor screen, have been widely adopted in recent years.

Diagnostic ultrasound systems, in which ultrasonic waves are irradiated to an intracavitary organ and the state of the intracavitary organ is rendered according to the magnitude of reflection or transmission of the ultrasonic waves, so that the intracavitary organ can be examined or diagnosed while being viewed through a monitor screen, have enjoyed popularity these days.

Aside from the endoscope system or diagnostic ultrasound system, diagnostic systems using an electronic (electric) means to enable examination or diagnosis of a living body while viewing the state of the living body have been put to use or proposed.

On the other hand, proposals have been made for an image display unit based on a medical image database that is useful for managing numerous images produced by the endoscope system, diagnostic ultrasound system, or the like.

An image filing system is included in the endoscope system or diagnostic ultrasound system so that endoscopic or ultrasonic images produced by an electronic endoscope or an ultrasound probe can be recorded on a recording medium such as a magneto-optical disk for future diagnostic use, and thus used on a systematic basis.

Prior arts include an image filing system disclosed in, for example, Japanese Patent Laid-Open No.6-110986. The image filing system comprises an image recorder for performing reversible or non-reversible compression on image signals sent from an endoscope system or an ultrasound system and storing the resultant signals as image data representing a plurality of images, an image reproducer for reproducing an image recorded in the image recorder, and a data communication unit enabling communication between an external host computer and the image recorder via a data input/output terminal. Data concerning a patient to be examined by the endoscope or ultrasound system is entered at an examination reception terminal connected to the host computer, transferred to the image recorder via the data communication unit, and then stored in the form of a database. Thus, a great number of images produced by a plurality of endoscope systems or the like can be stored and managed.

An image display unit included in the foregoing image filing system may consist of a processing means for enlarging or reducing at least one first view image without changing the amount of image data, and a synthesizing means for synthesizing a second view image produced by enlarging or reducing the first view image using the processing means and as least the first view image with other image.

The foregoing image display unit can simultaneously display the first view image and the second view image produced by enlarging or reducing the first view image without changing the amount of image data.

However, the image display unit in accordance with the prior art does not allow simultaneous reference of image files containing different retrieval information, for example, endoscopic images rendering a lesion of the same patient and being produced before and after treatment. The operability is unsatisfactory when it comes to close diagnosis to be performed through simultaneous reference of view images retrieved according to different retrieval information.

OBJECTS AND SUMMARY OF THE INVENTION

An object of the present invention is to provide a medical image filing system enabling reference of a plurality of images contained in image files retrieved according to a plurality of retrieval information items and thus realizing close diagnosis.

Another object of the present invention is to provide a medical image filing system making it possible to distinguish a plurality of displayed reduced images according to management information.

Yet another object of the present invention is to provide a medical image filing system that even when the number of reduced images contained in an image file exceeds the number of reduced images to be displayed, enables reference of all the reduced images in the image file.

Still another object of the present invention is to provide a medical image filing system capable of guaranteeing safety of application and other programs to be run.

A medical image filing system in accordance with the present invention comprises an image input means for inputting an image in the form of image data, a file creating means for creating an image file using at least one image and management information concerning the image, a file storage means for storing image files, a file retrieving means for retrieving image files from the file storage means according to the management information, a selecting means for selecting any of the image files retrieved according to the management information by the file retrieving means, and a display means for fetching images from the image files retrieved the data storage means and then selected by the selecting means and displaying them.

Other features and advantages of the present invention will be fully apparent from the description below.

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1 to 19 relate to an embodiment in accordance with the present invention;

FIG. 1 is a block diagram showing the configuration of an image filing system;

FIG. 2 shows the organization of an image file to be retrieved by the image filing system in FIG. 1;

FIG. 3 shows the structure of systems in the image filing system in FIG. 1;

FIG. 4 is a flowchart describing a sequence of system management based on a password and achieved by a password supervisor;

FIG. 5 is a flowchart describing a sequence of image file creation performed by the image filing system in FIG. 1;

FIG. 6 is a flowchart describing a sequence of recording a created image file on a hard disk in a server unit in FIG. 1;

FIG. 7 is a flowchart describing a sequence of retrieving an image file from the hard disk in the server unit in FIG. 1;

FIG. 8 is an explanatory diagram concerning a retrieval monitor displaying a list of image files retrieved according to the sequence of FIG. 7;

FIG. 9 is a flowchart describing a sequence of selecting any of image files retrieved according to the sequence of FIG. 8 and displaying images;

FIG. 10 is an explanatory diagram concerning a screen appearing on the retrieval monitor when one image file is selected according to the sequence of FIG. 9;

FIG. 11 is an explanatory diagram concerning a screen appearing on the retrieval monitor when two image files are selected according to the sequence of FIG. 9;

FIG. 12 is an explanatory diagram concerning a screen appearing on the retrieval monitor when three image files are selected according to the sequence of FIG. 9;

FIG. 13 is an explanatory diagram concerning a screen appearing on the retrieval monitor when four image files are selected according to the sequence of FIG. 9;

FIG. 14 is a flowchart describing patient data editing performed by the image filing system in FIG. 1;

FIG. 15 is an explanatory diagram concerning a screen appearing on the retrieval monitor when four image files are selected by performing editing shown in FIG. 14;

FIG. 16 is an explanatory diagram concerning a screen appearing on the retrieval monitor in edit mode in which the editing described in FIG. 14 is under way;

FIG. 17 is an explanatory diagram concerning an example of a variant screen that appears on a viewing monitor in a conference unit and that renders the contents of image files selected according to the sequence of FIG. 9;

FIG. 18 is an explanatory diagram concerning the viewing monitor in the conference unit which displays in full a desired image contained in an image file selected according to the sequence of FIG. 9; and

FIG. 19 is a flowchart describing a sequence of scrolling images contained in image files selected according to the sequence of FIG. 9.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, an embodiment of the present invention will be described below.

As shown in FIG. 1, an image filing system 1 of an embodiment in accordance with the present invention comprises a video processor 2 for fetching an image signal from, for example, an electronic endoscope that is not shown and converting it into a video signal, a viewing monitor 3 for rendering the video signal sent from the video processor 2, an input unit 4 for converting the video signal sent from the video processor 2 into an image and performing signal processing on the image, a server unit 5 for storing the image subjected to signal processing by the input unit 4 and compressed an image produced by compressing the image on a reversible or non-reversible basis, and a conference unit 6 for retrieving and displaying the image or compressed image stored in the server unit 5.

The input unit 4 consists of an A/D converter 11 (image input means) for converting R, G, and B analog video signals, which constitute a video signal sent from the video processor 2, into digital signals representing an image, an image processor 12 (file creating means) having a memory for storing images and creating an image file containing management information sent from the video processor 2, a local area network (hereinafter LAN) controller 13 for transmitting an image file created by the image processor 12 to the server unit 5 over a LAN cable 4*a*, and a controller 14 for transferring management information concerning an image to or from the video processor 2 and controlling the image processor 12 and LAN controller 13.

The video processor 2 has a video signal output terminal, R, G, and B analog video signal output terminals, and a communication signal output terminal. The video signal output terminal is connected to the viewing monitor 3, the R, G, and B analog video signal output terminals are connected to an input terminal of the A/D converter 11, and the communication signal output terminal is connected to the controller 14.

An output terminal of the A/D converter 11 is connected to a data signal terminal of the image processor 12.

A control signal terminal and data signal terminal of the controller 14 are connected to control signal terminals of the image processor 12 and LAN controller 13 over a bus 14*a*. The controller 14 controls the image processor 12 and LAN controller 13 by sending signals over the bus 14*a*.

A view provided by, for example, an electronic endoscope that is not shown and converted into a video signal by the video processor 2 is rendered as a view image to be displayed on the viewing monitor 3. When an operator of the video processor 2 determines that the view image should be stored, the video signal is provided in the form of R, G, and B analog video signals to the A/D converter 11. The A/D converter 11 converts the R, G, and B analog video signals into R, G, and B digital video signals by performing given quantization, and supplied them as image data representing a view image to the image processor 12.

The image processor 12 stores the view image supplied from the A/D converter 11 under the control of the controller 14.

The controller 14 performs various data processing including reduction on the view image stored in the image processor 12, appends management information to the view image so as to create an image file, and stores the image file temporarily in the image processor 12 or supplies the image file to the LAN controller 13. When storing an image file subjected to various data processing temporarily in the image processor 12, the controller 14 supplies the image file from the image processor 12 to the LAN controller 13 according to given timing.

The server unit 5 consists of a LAN controller 21 for receiving an image file from the LAN controller 13 in the input unit 4, a memory 22 for temporarily storing the image file received by the LAN controller 21, a hard disk driver 24 for storing the image file received by the LAN controller 21 on a large-capacity storage medium, for example, a hard disk 23 (file storage means), a compressor 25 for compressing the image file received by the LAN controller 21 on a reversible or non-reversible basis and sending a compressed image to the hard disk driver 24, and a controller 26 for controlling the LAN controller 21, memory 22, hard disk driver 24, and compressor 25. The hard disk driver 24 stores an image file and compressed image on the hard disk 23, and the LAN controller 21 transmits the image file or compressed image stored on the hard disk 23 to the conference unit 6 over a LAN cable 5*a*.

A LAN cable terminal **4***a* of the LAN controller **13** in the input unit **4** is connected to the LAN controller **21** in the server unit **5**. The LAN cable **4***a* is what is called a 10-base-T cable, wherein a twisted pair is used to enable bidirectional data communication at a data transfer rate of 10M bits/sec within a length of 100 mm and to thus permit control and data transfer among a plurality of units.

A control signal terminal and data signal terminal of the controller **26** in the server unit **5** are connected to control signal terminals of the memory **22**, LAN controller **21**, and hard disk driver **24** over a bus **26***a*.

In the server unit **5**, the LAN controller **21** receives an image file from the LAN controller **13** in the input unit **4** over the LAN cable **4***a*. The controller **26** stores the image file received by the LAN controller **21** temporarily in the memory **22**. The hard disk driver **24** stores the image file on, for example, the hard disk **23**.

The conference unit **6** consists of a LAN controller **31** for receiving an image file or compressed image from the LAN controller **21** in the server unit **5** over a LAN cable **5***a*, an image processor **32** (data memory means) for storing the image file or compressed image received by the LAN controller **31**, a stretcher **33** for stretching the compressed image stored in the image processor **32**, a D/A converter **34** for converting an image represented by digital signals and contained in the image file stored in the image processor **32** and the image stretched by the stretcher **33** into R, G, and B analog video signals by performing de-quantization, a viewing monitor **35** (display means) for rendering the R, G, and B analog video signals provided by the D/A converter **34**, and a controller **36** for controlling the image processor **32**.

A data signal terminal of the image processor **32** is connected to an input terminal of the D/A converter **34**. An output terminal of the D/A converter **34** is connected to the viewing monitor **35**. A control signal terminal and data signal terminal of the controller **36** are connected to control signal terminals of the image processor **32** and LAN controller **31** over a bus **36***a*. The control signal terminal and data signal terminal of the controller **36** are connected to a control signal terminal of a CPU **41**, which will be described later, over a bus **36***b*.

The conference unit **6** further comprises a CPU **41** (file retrieving means) for controlling the controller **36**, a keyboard **42** for use in entering a request for retrieving an image file to be issued to the server unit **5** and entering various information concerning the image file, a keyboard interface **43** for attaining consistency between a signal sent from the keyboard **42** and a signal sent from the CPU **41**, a retrieval monitor **44** for displaying information entered at the keyboard **42**, a mouse **45** (selecting means) for use in giving an instruction to change coordinates of a cursor in a screen on the retrieval monitor **44** into any other coordinates, a mouse interface **46** for attaining consistency between a signal sent from the mouse **45** and a signal sent from the CPU **41**, a hard disk **47** storing programs to be run by the CPU **41** and various data including the image data representing a menu screen on the retrieval monitor **44**, a hard disk interface **48** for attaining consistency between a signal sent from the hard disk **47** and a signal sent from the CPU **41**, a work memory **49** used as a work area by the CPU **41** during various processing, and an image processor **50** including a memory for storing R, G, and B digital video signals to be rendered on the retrieval monitor **44**.

The conference unit **6** further comprises a password memory **61** for storing a password included in information entered at the keyboard **42** and transferred by the CPU **41**, a password supervisor **62** for determining what level the password stored in the password memory **61** ranks, and a control restrainer **63** for restraining control of the CPU **41** according to the result of determination made by the password supervisor **62**.

A control signal terminal and data signal terminal of the CPU **41** are connected to control signal terminals and data signal terminals of the hard disk interface **48**, mouse interface **46**, keyboard interface **43**, work memory **49**, image processor **50**, and password memory **61** over a bus **41***a*. The CPU **41** controls the hard disk interface **48**, mouse interface **46**, keyboard interface **43**, and work memory **49** over the bus **41***a*.

The mouse interface **46** detects a signal having a value that corresponds to a magnitude of physical relative movement of the mouse **45**, and places the signal in the work memory **49**. The work memory **49** stores the magnitude of movement.

The keyboard interface **43** places a character information signal supplied from the keyboard **42** in the work memory **49**. The work memory **49** stores the character information or the like.

The hard disk interface **48** reads programs to be run by the CPU **41** and image data representing a menu screen of the retrieval monitor **44** from the hard disk **47**, places the read programs and image data in the work memory **49**. The work memory **49** stores the programs and the image data for the retrieval monitor **44**.

The CPU **41** loads programs from the hard disk **47** to the work memory **49** at the time of turning on the power supply, and runs the programs to make actions.

As mentioned above, an image file stored on the hard disk **23** in the server unit **5** is supplied to the hard disk driver **24** under the control of the controller **26**, and then temporarily stored in the memory **22** or supplied directly to the LAN controller **21**. The image file is fed from the LAN controller **21** to the LAN controller **31** in the conference unit **6** over the LAN cable **5***a*.

In the conference unit **6**, the LAN controller **31** supplies an image file to the image processor **32** under the control of the controller **36**. The image file read from the hard disk **23** in the server unit **5** and then stored in the image processor **32** is divided into a view image represented by digital data and management information under the control of the controller **36**. The view image represented by digital data is stored in the image processor **32**, while the management information is sent to the CPU **41** over the bus **36***b*.

The image processor **32** stores the view image. The view image stored in the form of digital signals in the image processor **32** is converted into R, G, and B analog video signals by the D/A converter **34** through de-quantization, and then supplied to the viewing monitor **35**. The viewing monitor **35** renders the supplied R, G, and B analog video signals. When the view image is a compressed image, the view image is stretched by the stretcher **33** and then supplied to the D/A converter **34**.

The CPU **41** performs computation so that a cursor moved by the mouse **45**, character information entered at the keyboard **42**, image data representing a menu screen or the like on the retrieval monitor **44** and being retrieved from the hard disk **47**, and management information can be displayed in a synthetic or individual fashion, and stores them as image data in the image processor **50**.

The file organization of an image file containing view image management information will be described in con-

junction with FIG. 2. As shown in FIG. 2, management information consists of an examination identification (hereinafter ID) number **71** assigned to each examination during which a plurality of consecutive images are stored, an image serial number **72** starting with 1 and indicating how many images are stored prior to an image concerned during the examination indicated with the ID number **71**, a patient ID number **73**, a patient name **74**, a date of examination **75**, a region code indicating a region to be examined in a human body, a position code **77** indicating a detailed position of the region to be examined in a human body, and an ID number **78** of the video processor **2**. An image file consists of the above management information, a view image **79** provided in the form of view image data, and reduced images **80** of the view image regarded as index images and provided in the form of reduced image data.

The view image data contained in an image file stored on the hard disk **23** is composed of a given number of bytes resulting from quantization to be performed so that, for example, a color view image is segmented into a matrix of 640 dots sideways by 480 dots lengthwise, and levels of each of R, G, and B signals rendering each dot are represented using, for example, eight bits.

The reduced image data contained in an image file stored on the hard disk **23** is composed of a given number of bytes resulting from quantization to be performed so that a color view image is segmented into a matrix of 160 dots, which is a quarter of 640 dots, sideways and 120 dots, which is a quarter of 480 dots, lengthwise, and then levels of each of R, G, and B signals rendering each dot are represented using, for example, eight bits.

Next, mention will be made of the role of a password in system management under an operating system in the conference unit **6**, especially, in system maintenance such as version upgrading of an application system.

In the conference unit **6**, the CPU **41** transfers a password entered at the keyboard **42** to the password memory **61**. The password supervisor **72** fetches the password from the password memory **61** and determines whether the password ranks level **1**.

The password supervisor **72** transfers a result of determination to the control restrainer **63**. In response to the result of determination, the control restrainer **62** restrains control of the CPU **41**.

A password may not be entered at a keyboard but may be entered using a bar code reader, magnetic card reader, mouse, or touch-sensitive panel.

In the conference unit **6**, as shown in FIG. **3**, an application system **81** activates programs responsible for control of image reproduction. The application system **81** runs under an operating system **82**.

During system management performed under the operating system **82**, as shown in FIG. **3**, an operator turns on the power supply of the conference unit **6** at step S1. The CPU **41** gives a password entry instruction through the retrieval monitor **44** at step S2. When a password is entered at the keyboard **42** at step S3, the password is transferred to the password memory **61**. The password is thus stored in the password memory **71**.

At step S4, the password supervisor **62** fetches the password from the password memory **61** and determines whether the password ranks, for example, level **1**. If the password ranks level **1**, a flag in the password supervisor **62** is set as listed in Table 1. The value 1 is transferred to the control restrainer **63**. The control restrainer **63** transfers data to permit the CPU **41** to pass control to the operating system **82**. Control is then passed to step S5.

TABLE 1

	Flag
Level 1	1
Other than level 1	0

At step S5, the CPU **41** passes control from a program, which runs under the application system **81** so as to control image reproduction, to the operating system **82**. The CPU **41** then displays an image concerning the operating system **82** on the retrieval monitor **44**, and passes control to step S6. At step S6, the operating system **82** can be operated using the keyboard **42** or the like. The operating system **82** can execute system maintenance to copy files or update programs or can run programs other than the program for controlling image reproduction. For terminating system maintenance, the power supply is turned off at step S7. This causes the operating system **82** to terminate.

If it is determined at step S4 that the password does not rank level **1**, the flag in the password supervisor **62** is reset as listed in Table 1. The value 0 is transferred to the control restrainer **63**. The control restrainer **63** transfers data to disable the CPU **41** from passing control to the operating system **82**. Control is then passed to step S8.

At step S8, the CPU **41** instructs the retrieval monitor **44** to display, for example, a menu screen in which a program for controlling an image can run under the application system **81** and execution of image reproduction can be instructed.

When an instruction is entered at the keyboard **42** at step S9, image reproduction is executed at step S10. For example, the CPU **41** controls the controller **36** so that an image will be fetched from the server unit **5**, reproduced, and sent to and displayed on the viewing monitor **35**.

At step S10, when the image fetched from the server unit **5** is an image compressed on a reversible or non-reversible basis, the CPU **41** transfers the image to the stretcher **33**, and sends a stretched image to the viewing monitor **35**. The stretched image is then displayed.

The CPU **41** then checks if image reproduction terminates. At step S11, whether or not to continue reproduction is indicated on the retrieval monitor **44**. For example, when it is designated at step S11 that modification of patient records or storing of modified patient records in the server unit **5** will be continued (when the result of determination made at step S11 is in the affirmative), control is passed to step S8 at which a screen for instructing execution of image reproduction, for example, a menu screen is displayed.

When it is designated at step S11 that image reproduction is not be continued (the result of determination made at step S11 is in the negative), control is returned to step S2 at which a screen for instructing entry of a password is displayed. When the power supply is turned off at step S12, the application system **81** terminates.

When a password is used for system management, unless a password ranking level **1** is entered, an operator cannot run the operating system **82**. This restraint guarantees safety of running application and other programs.

Owing to the restraint provided by a password, a third person is disabled from copying a file under the operating system **82**. Consequently, invasion of computer virus into a running application or other program can be prevented.

System management may not be based on a password. Alternatively, the conference unit **6** may be provided with, for example, a keyhole into which a key is fitted in order to close a lock and a key and lock supervisor for supervising the lock closed with the key. System management based on this mechanism would have the same advantage as the system management based on a password.

The operation of the image filing system **1** having the aforesaid configuration will be described.

A view provided by, for example, an electronic endoscope and converted into a video signal by the video processor **2** is rendered as a view image through the viewing monitor **3**. When an operator of the video processor **2** determines that the view image should be recorded, the view image is supplied in the form of R, G, and B analog video signals to the A/D converter **11**, converted into R, G, and B digital video signals by the A/D converter **11**, supplied in the form of view image data to the image processor **12**, and then stored in the image processor **12**.

The video processor **2** supplies management information concerning a view image and having been entered by an operator before or during examination to the controller **14** over a communication line.

The controller **14** performs various data processing including reduction on the view image recorded in the image processor **12**, and temporarily stores the view image with the management information appended as an image file in the image processor **12** or supplies the image file to the LAN controller **13**. After temporarily storing the image file having undergone the various data processing in the image processor **12**, the controller **14** transfers the view image from the image processor **12** to the LAN controller **13** according to given timing.

The controller **14** controls the image processor **12** and LAN controller **13** using signals sent over the bus **14***a*.

Next, a sequence followed by the controller **14** will be described in conjunction with FIG. **5**.

When an operator of the video processor **2** determines that a view image should be recorded, a sequence starts with step S21. Management information concerning the view image is sent to the controller **14** at step S22. The view image is stored in the form of view image data in the image processor **12** at step S23.

The controller **14** performs computation to convert the view image stored in the image processor **12** into reduced images. Management information is appended to the view image and reduced images, thus creating an image file. The image file is temporarily stored in the image processor **12** or supplied to the LAN controller **13**. At step S26, the created image file is sent from the LAN controller **13** to the LAN controller **21** in the server unit **5** over the LAN cable **4***a*. The sequence terminates at step S27.

The image file fed to the LAN controller **21** in the server unit **5** is placed temporarily in the memory **22** under the control of the controller **26**. With the control of the controller **26**, the image file in the memory **22** is saved on the hard disk **23** that is a large-capacity storage medium via the hard disk driver **24**.

Next, a sequence followed by the controller **26** will be described in conjunction with FIG. **6**.

When an image file is fed to the LAN controller **21**, a sequence starts with step S31. The image file is placed in the memory **22** at step S32.

The controller **26** saves the image file placed in the memory **22** onto the hard disk **23** via the hard disk driver **24** at step S33, and terminates the sequence at step S34.

The CPU **41** in the conference unit **6** controls, as shown in FIG. **1**, the hard disk interface **48**, mouse interface **46**, keyboard interface **43**, image processor **50**, work memory **49**, and password memory **61** over the bus **41***a*.

The CPU **41** passes control as mentioned above so that the hard disk interface **48** will read a program equivalent to processing executed by the CPU **41** from the hard disk **47**.

The read program is run to execute reproduction in which image files recorded on the hard disk **23** in the server unit **5** are retrieved and images contained in the image files are displayed on the viewing monitor **35** in the conference unit **6**.

Next, retrieval to be executed in the image filing system **1** by running a read program will be described in conjunction with FIG. **7**.

As shown in FIG. **7**, retrieval starts with step S41. At step S42, parameters for retrieving an image file are entered at the keyboard **42**. It is checked at step S43 if the parameters for retrieval are satisfactory. If it is found at step S43 that the parameters for retrieval satisfy an operator, control is passed to step S44. If the parameters for retrieval do not satisfy the operator, control is returned to step S42. The parameters for retrieval are modified by, for example, adding another parameters.

When entry of the parameters for retrieval is completed, at step S44, the parameters for retrieval entered at step S42 are delivered to the controller **35** over the bus **36***b*. At step S45, the LAN controller **31** is controlled by the controller **36** over the bus **36***a*. The parameters for retrieval are sent to the LAN controller **21** in the server unit **5** over the LAN cable **5***a*, and temporarily placed in the memory **22** by the controller **26** in the server unit **5**.

At step S46, the controller **26** controls the LAN controller **21**, memory **22**, and hard disk driver **24** over the bus **26***a*, and attempts to retrieve image files from the hard disk **23** according to the parameters for retrieval placed in the memory **22**. If image files defined with the parameters for retrieval are found, the image files are temporarily placed in the memory **22**.

At step S47, the image files in the memory **22** are supplied to the LAN controller **21** under the control of the controller **26**. The LAN controller **21** sends the image files to the LAN controller **31** in the conference unit **6** over the LAN cable **5***a* under the control of the controller **26**. With the control of the controller **36**, the image files are temporarily stored in the image processor **32**. Thereafter, management information concerning the image files are sent to the CPU **41** over the bus **36***b* and then placed temporarily in the work memory **49** under the control of the CPU **41**.

At step S48, the management information placed in the work memory **49** is transferred to the image processor **50** under the control of the CPU **41**. The image processor **50** runs a program to convert the whole or part of the management information into a screen, and displays the screen on the retrieval monitor **44**. Retrieval terminals at step S49.

FIG. **8** shows a screen appearing on the retrieval monitor **44** at the termination of retrieval performed according to the parameters for retrieval specifying endoscopic images of patient A.

As shown in FIG. **8**, a cursor **45***a* whose display position (coordinates) is changeable by moving the mouse **45** is displayed on the retrieval monitor **44**.

Displaying of reduced images contained in image files retrieved as mentioned previously will be described in conjunction with FIG. **9**.

As shown in FIG. 9, displaying of reduced images that are retrieved index images starts with step S61. At step S62, image files containing images that should be displayed on the viewing monitor 35 in the conference unit 6 are selected from among retrieved image files. This selection is achieved by moving the mouse 45 to the item of each intended image file as shown in FIG. 8 and then clicking a button on the mouse 45.

At step S63, S64, and S65, the CPU 41 determines how many image files are selected using the mouse 45 and identifies management information in the selected image files. In this embodiment, the number of image files that can be selected simultaneously ranges from 1 to 4.

When determination is made at step S63, S64, or S65, at step S66, S67, S68, or S69, images read from the work memory 49 are temporarily stored in the image processor 50 under the control of the CPU 41, and then displayed on the retrieval monitor 44.

At step S66, S67, S68, or S69, the management information in the selected image files and the number of selected image files are sent to the controller 36 over the bus 36*b*. Under the control of the controller 36, reduced images provided in the form of digital data and contained in selected image files in the image processor 32 are supplied to the D/A converter 34. The D/A converter 35 de-quantizes the digital data representing the reduced images to produce analog data, and supplies the analog data to the viewing monitor 35 so that the reduced images can be displayed on the viewing monitor 35. At step S70, reduced image display terminates.

FIG. 10 shows a screen of the retrieval monitor 44 appearing when the number of selected image files is one. Frames 100 to 115 on the retrieval monitor 44 indicate locations of reduced images to be displayed on the viewing monitor 35. In other words, reduced images of endoscopic images are displayed according to the layout shown in FIG. 10 on the viewing monitor 35. Numerals written in the frames 100 to 115 are serial numbers of image files relative to an examination ID number.

FIG. 11 shows a screen of the retrieval monitor 44 appearing when the number of selected image files is two. Frames 120 to 127 indicate locations of reduced images, which are contained in the first image file retrieved under the first parameters for retrieval, to be displayed on the viewing monitor 35. Frames 130 to 137 indicate locations of reduced images, which are contained in the second image file retrieved under the second parameters for retrieval, to be displayed on the viewing monitor 35. Numerals written in the frames 120 to 127 and 130 to 137 are serial numbers of image files relative to examination ID numbers.

FIG. 12 shows a screen of the retrieval monitor 44 appearing when the number of selected image files is three. Frames 140 to 143 indicate locations of reduced images, which are contained in the first image file retrieved under the first parameters for retrieval, to be displayed on the viewing monitor 35. Frames 150 to 153 indicate locations of reduced images, which are contained in the second image file retrieved under the second parameters for retrieval, to be displayed on the viewing monitor 35. Frames 160 to 163 indicate locations of reduced images, which are contained in the third image file retrieved under the third parameters for retrieval, to be displayed on the viewing monitor 19. Numerals written in the frames 140 to 143, 150 to 153, and 160 to 163 are serial numbers of image files relative to examination ID numbers.

FIG. 13 shows a screen of the retrieval monitor 44 appearing when the number of selected image files is four. Frames 170 to 173 indicate locations of reduced images, which are contained in the first image file retrieved under the first parameters for retrieval, to be displayed on the viewing monitor 35. Frames 180 to 183 indicate locations of reduced images, which are contained in the second image file retrieved under the second parameters for retrieval, to be displayed on the viewing monitor 35. Frames 190 to 193 indicate locations of reduced images, which are contained in the third image file retrieved under the third parameters for retrieval, to be displayed on the viewing monitor 35. Numerals written in the frames 170 to 173, 180 to 183, 190 to 193, and 200 to 203 are serial numbers of image files relative to examination ID numbers.

Next, editing of patient data or examination data will be described.

Editing of patient data or examination data is initiated, as shown in FIG. 14, by retrieving image files as described in conjunction with FIG. 7 at step S71 and then displaying reduced images contained in the image files as described in conjunction with FIG. 9 at step S72. FIG. 15 shows a screen of the retrieval monitor 44 appearing when the number of selected image files is four. The screen in FIG. 15 is identical to the one of FIG. 13 except that character data such as a patient ID number, patient name, and date of examination is written by the right side of a reduced-image display area for each set of reduced images. At the corners of character data areas, report display buttons 210 to 213 are depicted so that displaying of detailed data concerning patients in association with respective sets of reduced images can be instructed.

Returning to FIG. 14, description of editing will be continued. When an examination requiring editing of patient data is designated at step S73, any of the report display buttons 210 to 213 shown in FIG. 15 is selected by clicking the mouse 45. Assuming that patient data acquired during three examinations is to be edited, the report display buttons 210, 211, and 213 are activated by clicking the mouse 45. At step S74, patient data edit mode is set up. As shown in FIG. 16, three patient data sets are displayed in the form of windows. The order of displaying the three patient data windows 221, 222, and 223 can be changed by clicking the mouse positioned at a corner of any of the windows. The procedure is identical to the one implemented in a general graphic user interface, of which description will therefore be omitted.

When the edit mode is set up, at step S75 in FIG. 14, patient data written in the patient data windows 221, 222, and 223, for example, findings are edited using the mouse 45 and keyboard 43. When data editing is completed, resultant data is saved on the hard disk 47 at step S76. At step S77, it is waited that an instruction for termination of editing is entered, for example, at the keyboard 42. If editing is continued, control is returned to step S73. If the instruction is entered, editing terminates.

As for a reduced image, a normal image or color view image that is 640 dots wide and 480 dots long may be halved to 320 dots and 240 dots respectively by means of the image processor 32 in the conference unit 6 under the control of the controller 36. Such images may then be displayed in four-division mode on the viewing monitor as shown in FIG. 17.

Reduced (index) images appearing on the viewing monitor 35 can be returned to normal images, each of which is 640 dots wide and 480 dots long as shown in FIG. 18, using the mouse 45 or keyboard 42.

Next, scrolling of a screen showing reduced images contained in selected image files will be described in conjunction with FIG. 19.

Scrolling starts with step S81. At step S82, a left arrow mark **91** or a right arrow mark **92**, which is shown in FIG. **10**, is selected by the cursor **45***a* manipulated with the mouse **45**. Selected information is placed in the work memory **49**.

At step S83, it is determined whether forward or reverse scrolling is selected. When forward scrolling is selected, it is determined at step S84 whether the serial number of a reduced image displayed last is a last number relative to an examination ID number concerned. If the serial number is a last number, scrolling is terminated at step S85. Changing of screens of the retrieval monitor **44** is not carried out. If the serial number is not a last number, reduced images are fed one by one forward or in descending order of serial numbers at step S86.

When reverse scrolling is selected, it is determined at step S87 whether the serial number of a reduced image displayed first is one. If the serial number is one, scrolling is terminated at step S85 and changing of screens of the retrieval monitor **44** is not carried out. If the serial number is not one, reduced images are fed one by one reversely or in ascending order of serial numbers at step S88.

The foregoing scrolling may be performed in units of one line (four images) in FIG. **10**, **11**, **12**, **13**, or **15**. In FIG. **10**, scrolling may be performed in units of one page (sixteen images).

A view image that is provided in the form of digital data by the A/D converter **11** in the input unit in FIG. **1** may be compressed using a DCT or DPCM technique by the image processor **12**. In this case, the image processor **32** in the conference unit **6** uses the stretcher **33** to stretch the compressed view image through de-DCT or de-DPCM.

As described so far, according to the image filing system **1** of the present invention, a plurality of reduced (index) images of view images in retrieved image files can be displayed in the same screen so that desired images can be selected easily. Diagnosis can be made as reliably as conventional photograph-dependent diagnosis. A plurality of reduced images contained in image files retrieved according to a plurality of parameters for retrieval can be displayed simultaneously on the viewing monitor **35**. This facilitates comparative study of the progress of a patient's disease.

Various instructions can be entered using a mouse. This results in improved operability.

A means for producing view images is not limited to an endoscope system or a diagnostic ultrasound system.

According to the present invention, it will be apparent that a wide range of different embodiments can be formed on the basis of the invention without departing from the spirit or scope of the invention. This invention is limited to the appended claims but not restricted to any specific embodiments.

What is claimed is:

1. A method of managing medical image files, comprising:

an image input step at which image data is inputted;

an image file creating step at which an image file is created by having the image data inputted at said image input step, management information for specifying the image data and reduced image data of said image data respectively be related to one another;

a file storage step at which at least one image file created at said image file creating step is stored in a file storage means;

a retrieving condition input step at which a predetermined retrieving condition to specify desired image data among the image data stored as the image file in said file storage means is inputted;

a retrieving step at which respective management information of the image file stored in said file storage means is retrieved in accordance with the retrieving condition inputted at said retrieving condition input step, and at least one image file is specified based on each of at least one management information which meets said retrieving condition;

a first display control step at which reduced images as many as possible to be displayed in a display area of a display means are displayed on the display means based on the reduced image data of the image file specified at said retrieving step;

a management information display instruction step at which display instruction is given for displaying at least one management information related to the reduced image displayed on the display means at said first display control step;

a management information display instruction reception step at which said display instruction at said management information display instruction step is received when the reduced image based on said reduced image data is displayed on the display means by said first display control step;

a second display control step at which at least one management information instructed to be displayed at said management information display instruction step is displayed on a display means when said display instruction is received at said management information display instruction reception step;

a scrolling instruction step at which instruction is given to perform a scrolling to display reduced image, which is related to the reduced image displayed on the display means by said first display control step but not displayed on the display means on the display means; and

a scrolling step at which a scrolling is performed to display the reduced image which is related to the reduced image displayed on the display means by said first display control step but not displayed on the display means, on the display means upon scrolling display instruction by said scrolling instruction means.

2. A method of managing medical image files according to claim **1**, further comprising:

a selecting step at which any desired management information of the management information displayed on the display means at said second display control step is selected; and

an editing step at which the management information selected at said selecting step is edited.

3. A method of managing medical image files, comprising:

an image input step at which image data is inputted;

an image file creating step at which an image file is created by having the image data inputted at said image input step, management information for specifying the image data and reduced image data of said image data respectively be related to one another;

a file storage step at which at least one image file created at said image file creating step is stored in a file storage means;

a retrieving condition input step at which a predetermined retrieving condition to specify desired image data among the image data stored as the image file in said file storage means is inputted;

a retrieving step at which respective management information of the image file stored in said file storage means is retrieved in accordance with the retrieving condition inputted at said retrieving condition input step, and at least one image tile is specified based on each of at least one management information which meets said retrieving condition;

a first display control step at which at least one reduced image is displayed on a display means based on the reduced image data of the image file specified at said retrieving step;

a management information display instruction step at which display instruction is given for displaying at least one management information related to the reduced image displayed on the display means by said first display control step;

a management information display instruction reception step at which said display instruction at said management information display instruction step is received when the reduced image based on said reduced image data is displayed on the display means by said first display control step; and

a second display control step at which at least one management information instructed to be displayed at said management information display instruction step is displayed on the display means when said display instruction is received at said management information display instruction reception step.

4. A method of managing medical image files according to claim 3, further comprising a data memory step at which at least images contained in said image files retrieved at said file retrieval step are temporarily stored.

5. A method of managing medical image files according to claim 3 or 4, further comprising a display control step at which a screen provided at said display step is controlled according to the number of image files selected at said selection step.

6. A method of managing medical image files according to claim 3 or 4, wherein said image is an endoscopic image.

7. A method of managing medical image files according to claim 3, further comprising:

a selecting step at which any desired management information of the management information displayed on the display means at said second display control step is selected; and

an editing step at which the management information selected at said selecting step is edited.

8. A medical image file system, comprising;

an image input means for inputting image data;

an image file creating means for creating an image file by having the image data inputted by said image input means, management information for specifying said image data and reduced image data of said image data respectively be related to one another;

a file storage means for storing at least one image file created by said image file creating means;

a retrieving condition input means for inputting a predetermined retrieving condition to specify desired image data among the image data stored as the image file in said file storage means;

a retrieving means for retrieving respective management information of the image file stored in said file storage means in accordance with the retrieving condition inputted by said retrieving condition input means and specifying at least one image file based on each of at least one management information which meets said retrieving condition;

a first display control means for displaying reduced images as many as possible to be displayed in a display area of a display means on the display means based on the reduced image data of the image file specified by said retrieving means;

a management information display instruction means for instructing to display at least one management information related to the reduced image displayed by said first display control means on the display means;

a management information display instruction reception means for receiving said display instruction from said management information display instruction means when the reduced image based on said reduced image data is displayed on the display means by said first display control means;

a second display control means for displaying at least one management information instructed to be displayed by said management information display instruction means on the display means when said display instruction is received by said management information display instruction reception means;

a scrolling instruction means for instructing to perform a scrolling to display reduced image, which is related to the reduced image displayed on the display means by said first display control means but not displayed on the display means on the display means; and

a scrolling means for performing a scrolling to display the reduced image, which is related to the reduced image displayed on the display means by said first display control means but not displayed on the display means on the display means upon scrolling display instruction by sad scrolling instruction means.

9. A medical image filing system according to claim 8, further comprising:

a selecting means for selecting any desired management information of the management information displayed on the display means by said second display control means; and

an editing means for editing the management information selected by said selecting means.

10. A medical image filing system, comprising:

an image input means for inputting image data;

an image file creating means for creating an image file by having the image data inputted by said image input means, management information for specifying the image data and reduced image data of said image data respectively be related to one another;

a file storage means for storing at least one image file created by said image file creating means;

a retrieving condition input means for inputting a predetermined retrieving condition to specify desired image data among the image data stored as the image file in said file storage means;

a retrieving means for retrieving respective management information of the image file stored in said file storage means in accordance with the retrieving condition inputted by said retrieving condition input means and specifying at least one image file based on each of at least one management information which meets said retrieving condition;

a first display control means for displaying at least one reduced image on a display means based on the reduced image data of the image file specified by said retrieving means;

a management information display instruction means for instructing to display at least one management information related to the reduced image displayed on the display means by said first display control means on the display means;

a management information display instruction reception means for receiving said display instruction from said management information display instruction means when the reduced image based on said reduced image data is displayed on the display means by said first display control means; and

a second display control means for displaying on the display means at least one management information instructed to be displayed by said management information display instruction means when said display instruction is received by said management information display instruction reception means.

11. A medical image filing system according to claim **10**, further comprising a data memory means for temporarily storing at least said images fetched from said image files retrieved by said file retrieving means.

12. A medical image filing system according to claim **10**, further comprising a display control means for controlling said display means according to the number of image files selected by said selecting means.

13. A medical image filing system according to claim **12**, further comprising:

a password input means for inputting a password;

a password memory means for storing said password;

a password supervising means for supervising said password stored in said password memory means; and

a control means for controlling said retrieving means according to a result of supervision made by said password supervising means.

14. A medical image filing system according to claim **12** further comprising:

a keyhole means into which a key is fitted in order to close a lock;

a key and lock supervising means for supervising the state in which said lock is closed with said key; and

a control means for controlling said retrieving means according to a result of supervision made by said key and lock supervising means.

15. A medical image filing system according to claim **12**, further comprising:

an image compressing means for compressing said image file on a reversible or non-reversible basis so as to produce a compressed image file; and

an image stretching means for stretching said compressed image file;

said file storage means storing a compressed image file, and said display means displaying an image contained in said compressed image file stretched by said image stretching means.

16. A medical image filing system according to claim **12**, wherein said image is an endoscopic image.

17. A medical image filing system according to claim **10**, further comprising an information display means for displaying said management information concerning said plurality of reduced images displayed by said display means at a position associated with the position at which said plurality of reduced images are displayed.

18. A medical image filing system according to claim **17**, further comprising a reduced image selecting means that when the number of reduced images contained in each image file exceeds the number of reduced images which can be displayed by said display means, modifies said management information to be displayed by said information display means and selects reduced images to be displayed by said display means.

19. A medical image filing system according to claim **10** or **11**, further comprising:

a password input means for inputting a password;

a password memory means for storing said password;

a password supervising means for supervising said password stored in said password memory means; and

a control means for controlling said retrieving means according to a result of supervision made by said password supervising means.

20. A medical image filing system according to claim **10** or **11**, further comprising:

a keyhole means into which a key is fitted in order to close a lock;

a key and lock supervising means for supervising the state in which said lock is closed with said key; and

a control means for controlling said retrieving means according to a result of supervision made by said key and lock supervising means.

21. A medical image filing system according to claim **10** or **11** further comprising:

an image compressing means for compressing said image file on a reversible or non-reversible basis so as to produce a compressed image file; and

an image stretching means for stretching said compressed image file;

said file storage means storing a compressed image file, and said display means displaying an image contained in said compressed image file stretched by said image stretching means.

22. A medical image filing system according to claim **10** or **11**, wherein said image is an endoscopic image.

23. A medical image filing system according to claim **10**, further comprising:

a selecting means for selecting any desired management information of the management information displayed on the display means by said second display control means; and

an editing means for editing the management information selected by said selecting means.

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